INSTRUCTION MANUAL

GenRad

GR 1539 Stroboslave®

stroboscopic light source

Form 1539-0100-F

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Concord, Massachusetts, U.S.A. 01742
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NOTE

This instrument may be triggered by the GR 1546 Strobotac® digital stroboscope. Refer to the 1546 Instruction Manual for further information.

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SPECIFICATIONS

Flash Rate: 0 to 25,000 flashes per minute, eternally triggered only.

Light Output: Beam width is 10° at ½-intensity points.

	Duration*	Energy**	Beam Intensity†
at 700 fpm	3 μs	0.5 Ws	11×10^6 cd
at 4200 fpm	1.2 μs	0.09 Ws	3.5×10^6 cd
at 25,000 fpm	0.8 μs	0.014 Ws	0.6×10^6 cd

* Measured at ⅓ of peak-intensity points.

** Electrical input to lamp, watt-seconds.

† Measured with silicon photo detector 1 meter from lamp; single-flash beam intensity is 18×10^6 candela.

External Trigger: Contact closure or pulse of ≥ + 2 V pk applied to phone jack.

Supplied: Phone plug for input jack, mounting bracket, attached power cord.

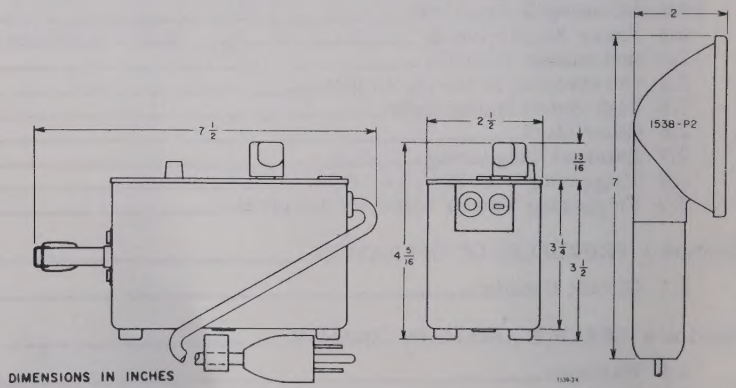
Available: 1536 Photoelectric Pickoff with 1531-P2 Flash Delay (available as 1539-Z Motion Analysis and Photography Set), 1537 Photoelectric Pickoff.

Power: 100 to 125 or 195 to 250 V, 50 to 400 Hz, 16 W max.

Mechanical: Metal case with detachable lamp housing. DIMENSIONS (wxhxd): 1539-A, 2.5x8.38x4.13 in. (64x213x105 mm). WEIGHT: 1539-A, 3 lb (1.4 kg) net, 8 lb (3.7 kg) shipping; 1539-Z, 6 lb (2.8 kg) net, 17 lb (8 kg) shipping.

Description	Catalog Number
1539-A Stroboslave® stroboscopic light source	**1539-9701**
1539-Z Motion Analysis and Photography Set	
115-V Model	**1539-9900**
230-V Model	**1539-9901**
1531-P4 Trigger Cable, for use with 1531 Strobotac	**1531-9604**
1538-P1 Strobotron Flash Lamp, replacement ◈	**1538-9601**

U.S. Patent Number 2,977,508.



DIMENSIONS IN INCHES

SECTION 1

INTRODUCTION

1.1 PURPOSE.

The Type 1539 Stroboslave is a small, inexpensive stroboscope, in many respects similar to the Type 1531 and Type 1538 electronic stroboscopes. Unlike these conventional stroboscopes, the Type 1539 has no internal oscillator for flashing-rate control. Therefore, it must be triggered by an external device and cannot be used for direct measurement of rotational speeds and some slow-motion studies.

The Stroboslave is used for high-speed photography and observation of objects moving at high speeds. For these applications, the instrument is triggered by a contactor, switch, or photocell that is synchronized with the moving object. In some applications, the Stroboslave finds limited use as an auxiliary light source in conjunction with the more sophisticated Type 1531 and Type 1538 stroboscopes.

An external trigger signal automatically synchronizes the flash with periodic movement of the object being observed. When used with mechanical or photoelectric synchronizers, the instrument can be synchronized with nonperiodic (varying rpm) motion. When the Stroboslave is synchronized with a moving object, the object will appear to stop or stand still. If the flashing rate of the Stroboslave differs slightly from the fundamental speed of the moving object, (when the Stroboslave is driven by a Type 1531 or Type 1538), the object will appear to move slowly through a complete cycle.

Because of its compact size, the Type 1539 can be built into machines for permanent use. Multiple units, triggered by a common external signal, are used to illuminate larger areas. A socket, for mounting the instrument on a tripod, is provided on the case. The lamp assembly is detachable, thus making it possible to position the light source in otherwise inaccessible areas.

1.2 DESCRIPTION.

The Type 1539 produces a peak light intensity of up to 11 million beam candles when used on the HIGH-intensity range, and up to 18 million beam candles when used for single-flash applications. The Stroboslave operates over the same basic ranges, 0 to 25,000 flashes per minute, as the Type 1531 Strobotac.

Several methods are available for synchronization and control of the flashing rate; it can be triggered directly from a switch closure across the input jack, a positive electrical pulse of at least 2-volts peak, or by the General Radio instruments and accessories listed in Table 1-1.

Table 1-1

AVAILABLE INSTRUMENTS AND ACCESSORIES

Type	*Description*	*Catalog Number*
1531	Strobotac Electronic Stroboscope; use with Type 1531-P4 Trigger Cable	1531-9701 1531-9604
1538	Strobotac Electronic Stroboscope	1538-9701
1531-P2	Flash Delay; use with Type 1536-A Photoelectric Pickoff	1531-9602 1536-9701
1537	Photoelectric Pickoff	1537-9701

See Figure 1-1 for location of controls and connectors described in Table 1-2.

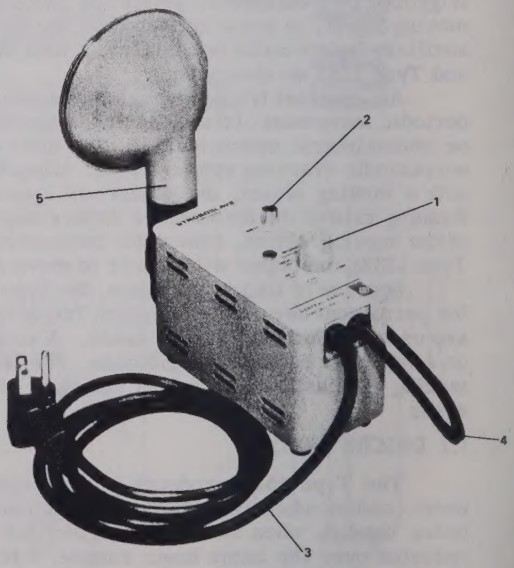


Figure 1-1.
Type 1539 Stroboslave. Refer to Table 1-2 for description of controls and connectors.

Table 1-2
TYPE 1539 CONTROLS AND CONNECTORS
(See Figure 1-1)

Ref No.	*Name*	*Function*
1	INTENSITY Switch	Turns instrument on and selects any of 3 intensity and corresponding flashing-rate ranges: HIGH Intensity - 0 to 700 flashes per minute MEDIUM Intensity - 0 to 4200 flashes per minute LOW Intensity - 0 to 25,000 flashes per minute
2	INPUT jack	Used for connecting an external trigger signal with phone plug supplied.
3	Power Cord	6-foot power cord and plug, permanently attached.
4	Lamp-Extension Cable	5-foot flexible cable used to permanently connect the lamp-reflector assembly to the instrument.
5	Lamp-Reflector Assembly	Mounted on instrument or detached for remote use; consists of lamp handle (with strobotron lamp), reflector, and reflector cover.

Table 1-3 lists accessories supplied with the Type 1539 Stroboslave.

Table 1-3
ACCESSORIES SUPPLIED

Catalog Number	*Description*	*Quantity*
1539-2000	Bracket Assembly	1
5330-0600	Fuse, 0.2 A	2
4270-1100	Phone Plug	1
7180-0050	Screw, 3/8-inch, 1/4-20	1

Do not drop the strobotron lamp or lamp assembly. If the lamp is subjected to severe physical impact, the electrode supports (inside the glass envelope) may become deformed and unsatisfactory operation will result. Check the operation of the Stroboslave and replace the strobotron lamp if necessary.

SECTION 2

OPERATING PROCEDURE

2.1 MOUNTING INSTRUCTIONS.

A mounting-bracket assembly is provided for mounting the Type 1539 Stroboslave, or the Stroboslave and the Type 1531-P2 Flash Delay when both instruments are used in combination. See Figures 2-1a and 2-1b. The mounting-bracket assembly consists of a support bracket for the Flash Delay, a mounting bracket for the Stroboslave (for mounting on either a horizontal or a vertical surface), bracket-assembly hardware, two screws (B) for mounting the Flash Delay unit, and one 3/8 inch, 1/4-20 screw (A) for securing the Stroboslave to the mounting bracket.

To mount the instruments on a horizontal surface, proceed as follows (see Figure 2-1a):

a. Nest the Stroboslave feet in the four 9/16" diameter holes in the bracket assembly as shown in Figure 2-1b, and tighten screw (A) securely. If the Flash Delay unit is not to be mounted with the Stroboslave, the bracket-assembly hardware and the support bracket may be omitted.

b. Mount the Flash Delay unit to the support bracket, using two screws (B) as shown.

c. Position the complete assembly in the desired mounting location. Use the four 7/32" diameter holes in the mounting bracket as a template to locate the mounting holes.

d. Mount the complete assembly firmly in position, using lock washers with the mounting screws.

To mount the instruments on a vertical surface, proceed as follows (see Figure 2-1b):

a. Omit the bracket-assembly hardware and assemble the Stroboslave, mounting bracket, and support bracket (as shown in Figure 2-1b), using screw (A).

b. Mount the Flash Delay unit to the support bracket using screws (B) as shown. If the Flash Delay is not to be used, omit the support bracket.

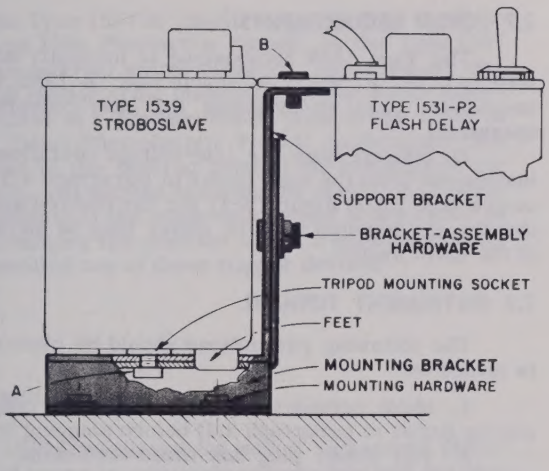


Figure 2-1a.
Mounting-bracket assembly for Type 1539 Stroboslave and Type 1531-P2 Flash Delay. Assembly for mounting on horizontal surface.

c. Position the complete assembly in the desired location on the vertical mounting surface and follow steps c and d above.

NOTE

When mounting on a vertical surface, the position of the mounting bracket can be reversed (see dotted outline, Figure 2-1b).

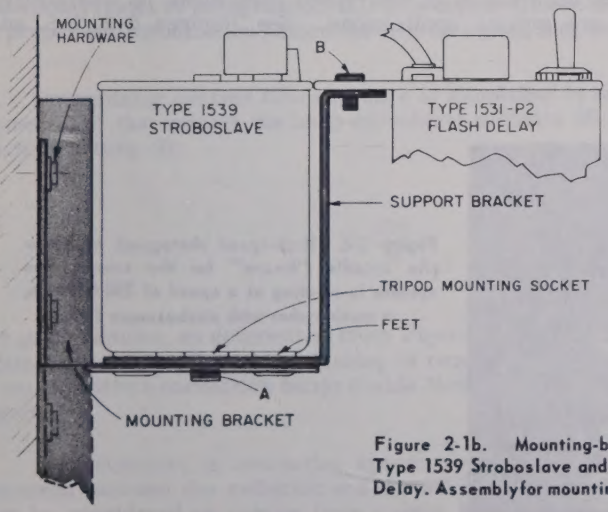


Figure 2-1b. Mounting-bracket assembly for Type 1539 Stroboslave and Type 1531-P2 Flash Delay. Assembly for mounting on vertical surface.

2.2 POWER REQUIREMENTS.

The Type 1539 Stroboslave is normally supplied to operate from a 100- to 125-volt, 50- to 400-cycle line. A LINE switch, located inside the instrument case, is available for easy conversion to 195- to 250-volt operation.

To convert from one line-voltage operation to the other, remove the instrument from the case (refer to paragraph 4.3.3) and position the LINE switch (see S102, Figure 4-1) for the desired setting. It is recommended that the tag supplied with the power plug be marked to indicate the setting of the LINE switch.

2.3 INSTRUMENT TURN-ON.

The following precautions should be observed before the instrument is turned on:

1. Make certain the power source corresponds to the LINE switch setting (refer to paragraph 2.2) before plugging into a power receptacle.
2. The power plug has three terminals. For operator safety, the third pin on the power plug must be properly grounded.

Connect the trigger signal to the INPUT jack of the Type 1539 Stroboslave. Turn the INTENSITY switch to the desired flashing-rate range.

2.4 OBSERVATION OF MOVING OBJECTS.

The Stroboslave is used for observation of objects revolving, or reciprocating, at speeds too fast to follow with the human eye. Trouble-shooting machinery, monitoring the operation of printing presses and weaving looms, and observation of high-speed phenomena in laboratories and classrooms are typical applications. See Figures 2-2, 2-5, and 2-6.

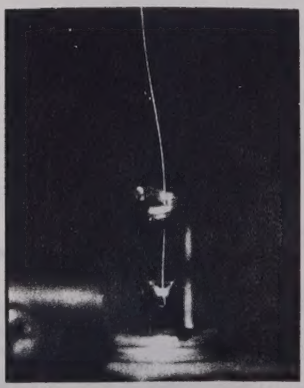


Figure 2-2. High-speed photograph of a textile spindle "frozen" for the camera; the spindle is rotating at a speed of 250,000 rpm, a routine shot with stroboscopic light.

The flashing rate of the Type 1539 is usually controlled by the Type 1531-P2 Flash Delay and Type 1536 Phoelectric Pickoff, by the Type 1537 Photoelectric Pickoff, or by an external switch closure. These trigger devices can be synchronized with motion of the machine or object under observation to trigger the Stroboslave at a predetermined point in the cycle of movement. With the Flash Delay/Photoelectric Pickoff combination, the trigger signal can be adjusted to any desired point in the cycle while the machine or object is in motion, and without changing the setup. With other photocells or switches, adjustment of the observation point in the cycle is accomplished by physically changing the position of the triggering device. Refer to paragraph 2.7 for detailed use of these trigger devices.

2.5 HIGH-SPEED PHOTOGRAPHY.

When using the Type 1539 Stroboslave for taking high-speed photographs, camera shutter speed becomes relatively unimportant and the photographer is able to capture on film the image of fast-moving objects. The light produced by the Stroboslave is a brilliant flash of such short duration, that the moving object is momentarily "frozen" for the camera. See Figure 2-2.

Synchronization of the light flash and the moving object can be obtained with a triggering device. Typical triggering techniques involve the use of fast-acting switches, photoelectric beams, trip wires, etc. Automatic synchronization of camera shutter and flash is available on the Type 1531-P2 Flash Delay (refer to paragraph 2.7.3). The entire system should be checked for proper synchronization before the film is loaded into the camera.

Determining correct film exposure is simplified by the use of a guide number (GN) that relates the lamp-to-subject distance (d) to the camera-aperture setting (f):

$$f = \frac{GN}{d}$$

The guide number, as determined from Figure 2-3, is used for single-flash applications. When repetitive flashing is required, the guide number must be multiplied by a correction factor (Guide Number Multiplier-K) taken from Figure 2-4.

It is necessary in computing aperture setting to modify the distance measured between the reflector and the subject. The light from the unit must be considered as coming from a point 1.5 feet behind the front of the

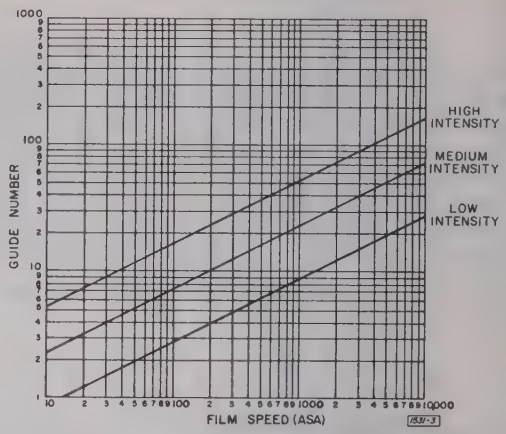


Figure 2-3. Guide number versus film speed for Type 1539 intensity settings. Data is for single-flash operation. See Figure 2-4 for correction required for repetitive flashing.

reflector. Therefore, 1.5 feet must be added to the measured distance between the reflector and subject. For example, if this distance is 2 feet, use 3.5 as the number to be divided into the guide number to obtain aperture setting.

The guide numbers shown in Figure 2-3 should be regarded only as a starting point for obtaining correct exposure. Contrast between subject and background, type of film, development techniques, and many other variables should also be taken into consideration. Trial photographs are

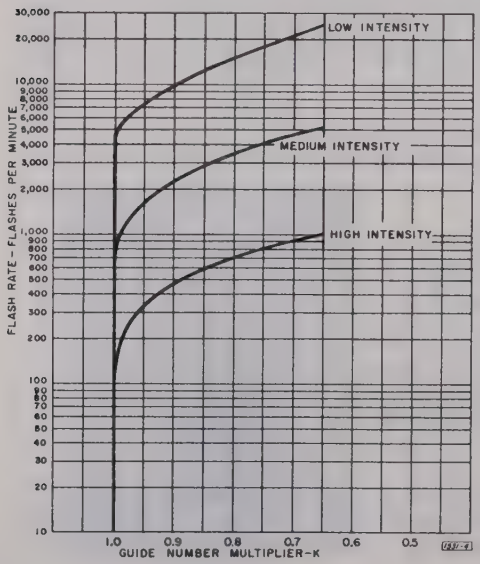


Figure 2-4. Guide number correction (see Figure 2-3) for repetitive flashing with a Type 1539 Stroboslave.

most helpful in determining optimum exposure. Follow the film manufacturer's recommendations when processing the film.

For detailed information on the use of the stroboscope for photographic applications, refer to General Radio's "Handbook of High-Speed Photography," which can be purchased for $1.00.

2.6 OTHER USES.

The Type 1539 is sometimes used as an auxiliary light source for applications involving speed measurements and slow-motion studies. In these cases, the Stroboslave merely provides a second source of light that is controlled by a Type 1531 or 1538 stroboscope (see Figure 2-5).

2.7 EXTERNAL TRIGGERING.

2.7.1 GENERAL.

The following paragraphs describe General Radio instruments and accessories that are used to trigger the Type 1539 Stroboslave. For complete specifications, and additional information concerning the operation and use of these instruments, refer to the General Radio catalog and individual instruction manuals normally supplied with these instruments.

2.7.2 USE WITH STROBOTAC TYPES 1531 AND 1538.

The Type 1539 Stroboslave serves as an auxiliary or "slave" light source when used with either the Type 1531 or Type 1538 Strobotac for speed measurements, motion studies (see Figure 2-5), or photographic work.

In general, the Type 1539 produces the same light-intensity output and operates over the same flashing rate ranges as the Type 1531 Strobotac. The Stroboslave can be used with the Type 1538 Strobotac for flashing rates up to 25,000 flashes per minute, however, at higher flashing rates — up to 150,000 flashes per minute with the Type 1538 — the Stroboslave cannot be used.

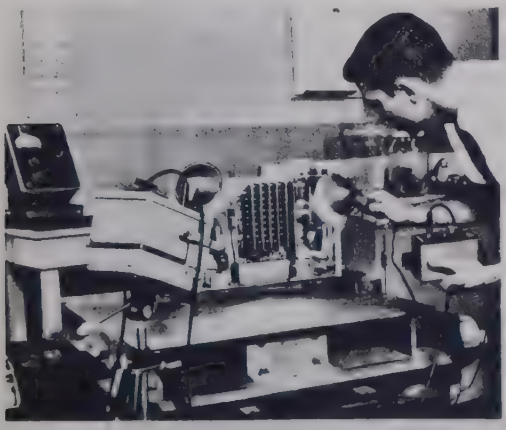


Figure 2-5.
Vibration test, using a Type 1538 Strobotac and additional light from a Type 1539 Stroboslave.

When used with the Type 1538 Strobotac, the Stroboslave is triggered directly through a Type 1560-P76 or equivalent connecting cable with a phone plug at both ends. When used with the Type 1531 Strobotac, the Stroboslave must be triggered through a Type 1531-P4 Trigger Cable.

2.7.3 USE WITH FLASH DELAY AND TYPE 1536 PICKOFF.

Two very useful accessories for the Stroboslave are the Type 1531-P2 Flash Delay and the Type 1536 Photoelectric Pickoff. See Figure 2-6. The combination of these three instruments makes it possible to synchronize the flash of the Type 1539 with a moving object at any desired point in its cycle of movement.

Figure 2-6. Observation of an addressing machine in operation, using a Flash Delay and Photoelectric Pickoff to synchronize the Stroboslave flash with the machine cycle.

The Flash Delay is a small, portable, time-delay unit that is used to insert an adjustable delay period between an externally generated trigger pulse (from the Photoelectric Pickoff) and the resulting flash produced by the Stroboslave. The Flash Delay works equally as well for continuous synchronization (repetitive movement) as for single-flash synchronization.

The Type 1536 Photoelectric Pickoff generates electrical impulses from variations in the intensity of light reflected from the object in motion. These impulses are fed to the Flash Delay where they are amplified, delayed, and shaped. The output from the Flash Delay is then used to trigger the Stroboslave. The Type 1536 consists of a light source, an optical system, and a photocell. Power for the photocell and light source is supplied by the Flash Delay unit.

2.7.4 USE WITH TYPE 1537 PICKOFF.

Like the Type 1536 Photoelectric Pickoff, the Type 1537 is used to convert the motion of a moving object into electrical impulses that are used

to trigger the Stroboslave. The Type 1537, however, has no built-in light source and it is used to trigger the Stroboslave directly; no Flash Delay unit is used, and no time delay is available. The photosensitive element, in this instrument, is a silicon light-activated switch.

The Type 1537 has no amplifier and it is designed to look directly at a source of light. A GE #330 lamp (1.1 W), for example, will operate the pickoff at a distance of 1/2 inch; a 40 W lamp will operate the pickoff at a distance of three inches.

Reflected light will also operate the Type 1537, if sufficient light is available and the rotating object has a highly reflective surface. If the surface is not highly reflective, reflecting tape applied to the surface will often reflect enough light to operate the Photoelectric Pickoff.

In cases where the light intensity (reflective or direct) is low, use the Type 1536 Pickoff and the Type 1531-P2 Flash Delay. The amplifier in the Flash Delay provides greater sensitivity.

2.8 TRIGGERING WITH SWITCH OR PULSE.

The Type 1539 can be triggered directly by the closing of a switch connected across the INPUT jack. The resulting short circuit across the input terminals generates a positive-going voltage step which automatically triggers the flash.

If the switch contacts bounce when the switch is closed, multiple trigger pulses will be generated and SCR holdover will result. A 0.01 uF capacitor across the switch contacts will eliminate this problem, but the maximum flashing rate of the instrument will be limited to 10,000 flashes per minute.

The instrument can also be triggered by a positive pulse of at least 2 volts peak, not exceeding a maximum of 500 volts. These pulses must have a rise time faster than 0.07 V/μsec. The Stroboslave will not operate from a sine-wave input.

2.9 TRIGGERING TWO OR MORE STROBOSLAVES.

Two or more Stroboslaves may be triggered by a common external signal when additional light is needed to illuminate a large area.

When the trigger signal is a positive pulse, a simple distribution box is required to divide the incoming signal. The circuit shown in Figure 2-7 will control three Stroboslaves. To control additional units, merely add more sections, as indicated by the dotted line. If this setup is used, the trigger signal must be a positive-going pulse of at least 5 V. The value of R should be 2.2 kΩ and C should be 0.01 μF.

If a switch closure is used, any number of Stroboslaves may be connected in parallel across the switch. In this case, all Stroboslaves can be triggered directly from a single switch closure and none of the components shown in Figure 2-7 are required.

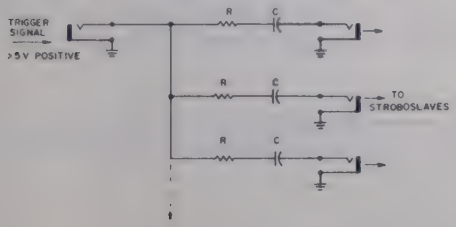


Figure 2-7. Distribution circuit recommended for controlling the flash of multiple Stroboslaves with a single, positive-going pulse.

SECTION 3

PRINCIPLES OF OPERATION

3.1 CIRCUIT DETAILS.

3.1.1 GENERAL.

The Type 1539 Stroboslave consists basically of a power supply, a trigger circuit, and a strobotron tube. Component designators in the following paragraphs refer to the elementary schematic, Figure 3-1, and the complete schematic diagram, Figure 4-4.

3.1.2 POWER SUPPLY.

Power for the strobotron and trigger circuits is furnished by a voltage-doubler power supply with an output of +420 volts and -425 volts, dc. The power transformer T101 is capable of operating on line frequencies ranging from 50 to 400 c/s, and either a 100- to 125-volt or 195- to 250 volt line. The transformer contains a LINE switch S102 for easy conversion to one voltage input or the other.

3.1.3 TRIGGER CIRCUIT.

The flashing rate of the instrument is controlled by an external signal that is connected to the input of the trigger circuit. A switch closure across the input jack generates a positive-going step that triggers SCR Q101. The SCR can also be triggered by a positive pulse. When Q101 is triggered, capacitor C107 discharges through the primary of pulse transformer T801, thus producing the high-voltage pulse necessary to trigger the strobotron.

3.1.4 STROBOTRON CIRCUIT.

The strobotron tube contains two main elements, a cathode and an anode. A discharge capacitor acts as a low impedance source of voltage

across these electrodes. The gas, however, remains deionized (non-conducting) until a pulse of high voltage from transformer T801 is applied to trigger wires interspersed between the two electrodes. This trigger pulse ionizes the gas and causes the energy stored in capacitor C103 to flow through the tube, thus generating an intense flash of white light.

After the strobotron tube flashes, the gas must deionize before the next flash can occur. This deionization time sets the limit on the maximum flashing rate of the instrument. If too high a voltage is applied across the strobotron before it is deionized, an erratic condition (continuous conduction) known as "holdover" will result.

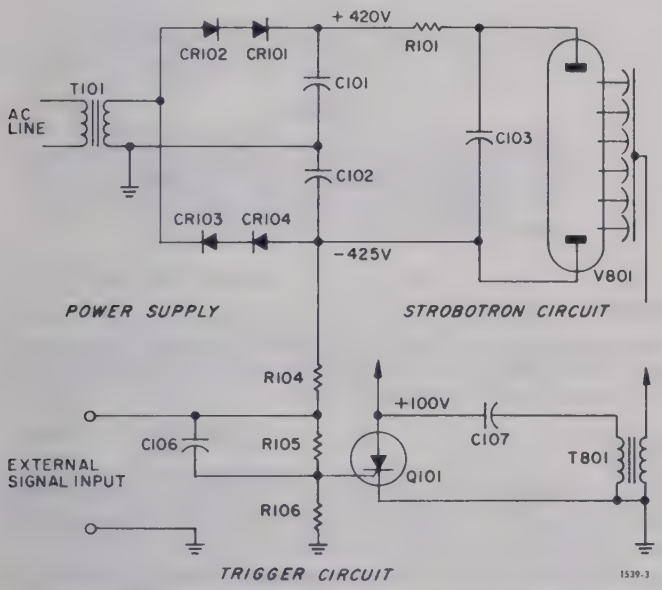


Figure 3-1. Elementary schematic for the Type 1539 Stroboslave.

3.1.5 EXTERNAL INPUT.

Operation at external input frequencies somewhat higher than those specified will not necessarily damage the strobotron, but operation could become erratic.

SECTION 4

SERVICE AND MAINTENANCE

WARNING

Dangerous voltages are present inside the case of this instrument. For safety, disconnect power plug and wait 3 minutes before opening. Refer all servicing to qualified personnel only.

4.1 WARRANTY.

The warranty given with every GenRad instrument attests the quality of materials and workmanship in our products. When difficulties do occur, our service engineers will assist in any way possible.

4.2 SERVICE.

In case of difficulties that cannot be eliminated by the use of these service instructions, please write or phone our Service Department, giving full information of the trouble and of steps taken to remedy it. Be sure to mention the serial and type numbers of the instrument.

Before returning an instrument to GenRad for service, please write to our Service Department or nearest district office (see back cover), requesting a Returned Material Tag. Use of this tag will ensure proper handling and identification. For instruments not covered by the warranty, a purchase order should be forwarded to avoid unnecessary delay.

4.3 MAINTENANCE.

4.3.1 GENERAL.

Always unplug the power cord before removing the instrument from the case. Also, make certain that capacitors in the instrument are discharged before performing the service checks described in the following paragraphs.

4.3.2 CLEANING OF REFLECTOR AND COVER.

If it becomes necessary to clean the reflector and cover, pull the reflector from the extension-lamp handle assembly. Remove the cover by pushing on the edge of the cover at each of the three flanges that clamp over the reflector housing. Use a soft, lint-free cloth to clean the reflector surface and cover. If necessary, moisten with water. Do not use other solvents of any kind, as they may mar the surface.

4.3.3 REPLACEMENT OF STROBOTRON.

To replace the strobotron lamp, first remove the reflector from the handle assembly. Do not take off the reflector cover to replace the lamp. Make certain the replacement lamp is fully seated in the lamp socket.

WARNING

Disconnect power cord and wait 3 minutes before changing strobotron tube. Dangerous voltages are present at the lamp when operating. Lamp may be hot after operation.

4.3.4 REMOVAL OF INSTRUMENT FROM CASE.

To remove the instrument from the case, place the instrument on a horizontal surface with the panel facing upward. Remove the single screw located in the middle of the panel and slide the instrument straight up and out of the case.

4.3.5 ACCESS TO COMPONENTS.

To gain access to components mounted on the etched board, disassemble the etched-board assembly from the front panel (see Figure 4-1).

First, remove the instrument from the case. Then, loosen the set-screw in the intensity-switch knob and remove the knob. Next, remove the two screws which fasten the transformer assembly to one end of the etched board, and remove the nuts and washers which fasten the end-panel to the front panel of the instrument.

The instrument can now be separated as shown in Figure 4-1. To reassemble the instrument, reverse the procedure described above.

4.3.6 REPLACEMENT OF FUSE.

Remove the instrument from the case and replace the fuse, F101, see Figure 4-1. Be sure to use a properly-rated fuse, as called for in the parts list.

4.4 TROUBLE ANALYSIS.

4.4.1 GENERAL.

A GR 1806 Electronic Voltmeter, or any reliable voltmeter, can be used in making most of the checks described in the following

paragraphs. Component designators in the following paragraphs refer to Figures 4-1 through 4-4.

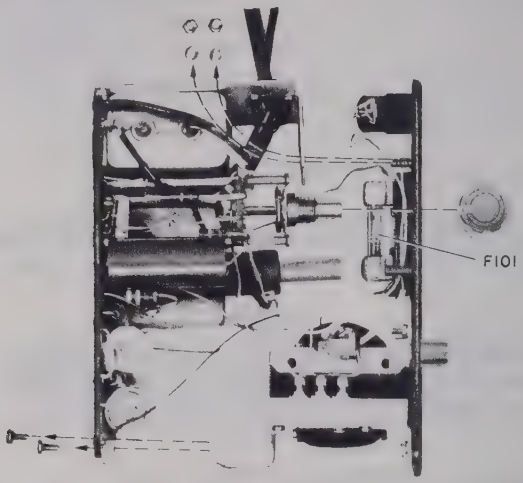


Figure 4-1. Internal view of the Type 1539 Stroboslave disassembled for access to components.

4.4.2 PRELIMINARY CHECKS.

If the Stroboslave is inoperative, make the following checks before removing the instrument from the case:

a. Voltage is available at the power receptacle to which the instrument is connected.

b. The voltage and frequency of the power source agree with the data on the voltage-selector-switch tag on the pins of the power plug.

c. Check connection to external signal source; the trouble may not be due to faulty operation of the Stroboslave.

d. The trouble may be caused by holdover. Turn the instrument off for 10 seconds and then turn it on again.

4.4.3 NO FLASH – NO PILOT LIGHT.

If the instrument will not flash and the pilot light does not glow, remove the instrument from the case and proceed as follows:

a. Make certain the LINE switch setting corresponds with the voltage and frequency of the power source, and with the data shown on the power-plug tag.

b. Look for an open fuse. If fuse blows when replaced, refer to paragraph 4.4.4.

c. Turn INTENSITY switch on and check for continuity between pins of power-cord plug. If an open circuit is indicated, check switches S101

and S102, and continuity of power-input circuit.

d. Pilot lamp P101 may be defective and some other difficulty may be preventing the Strobotron from flashing.

4.4.4 INSTRUMENT BLOWS FUSES.

If the instrument continually blows fuses:

a. Make certain replacement fuse is correct value.

b. Observe transformer T101 connections.

c. Make certain LINE switch S102 is properly connected and set in correct position for power input.

d. Check for accidental short circuits to ground at secondary of power transformer, or +420-volt and -425-volt lines.

e. Check for possible short circuits in C101 or C102.

f. Look for low back resistance of rectifier diodes CR101, CR102, CR103, and CR104. Measure forward and back resistance of each diode. (Measured value will depend upon type of instrument and scale used.) The back resistance should be much greater than the forward resistance. Also, the +420- or -425-volt supply will probably be low if diodes are faulty.

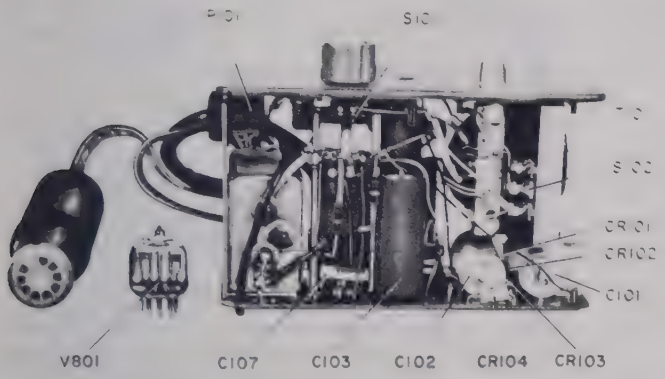


Figure 4-2. Side internal view of the Type 1539 Stroboslave.

4.4.5 STROBOTRON FLASHES ERRATICALLY.

If the instrument flashes erratically:

a. The strobotron lamp may be arcing at the base. The lamp is at the end of its useful life and should be replaced.

b. If the instrument is triggered by an external contactor, check the contactor for contact bounce. Add a 0.01 μF capacitor across the contacts if the instrument is to be operated below 10,000 flashes per minute (refer to paragraph 2.9).

c. Measure signal input from external equipment for proper input voltage and frequency.

d. If erratic firing continues, the trouble is probably due to "holdover" and the strobotron lamp should be replaced.

4.4.6 NO FLASH-PILOT LIGHT ON.

If the strobotron lamp will not flash, but the pilot light is on:

a. The lamp may fail to flash due to SCR holdover, turn the instrument off for about 10 seconds and then turn it on again.

b. Make certain the strobotron is firmly seated in the lamp socket.

c. Measure power supply voltages (+420 V and -425 V). If voltages are low, check diodes in power supply, and observe setting of LINE switch S102. Refer to paragraph 4.4.4.

d. Replace strobotron V801.

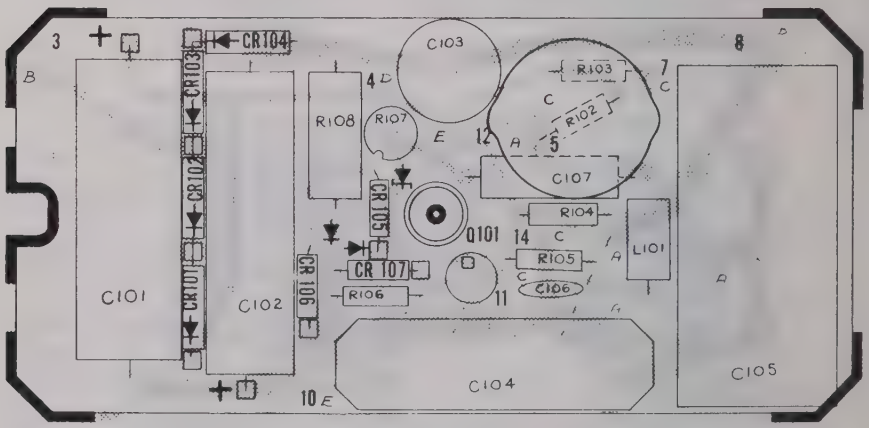
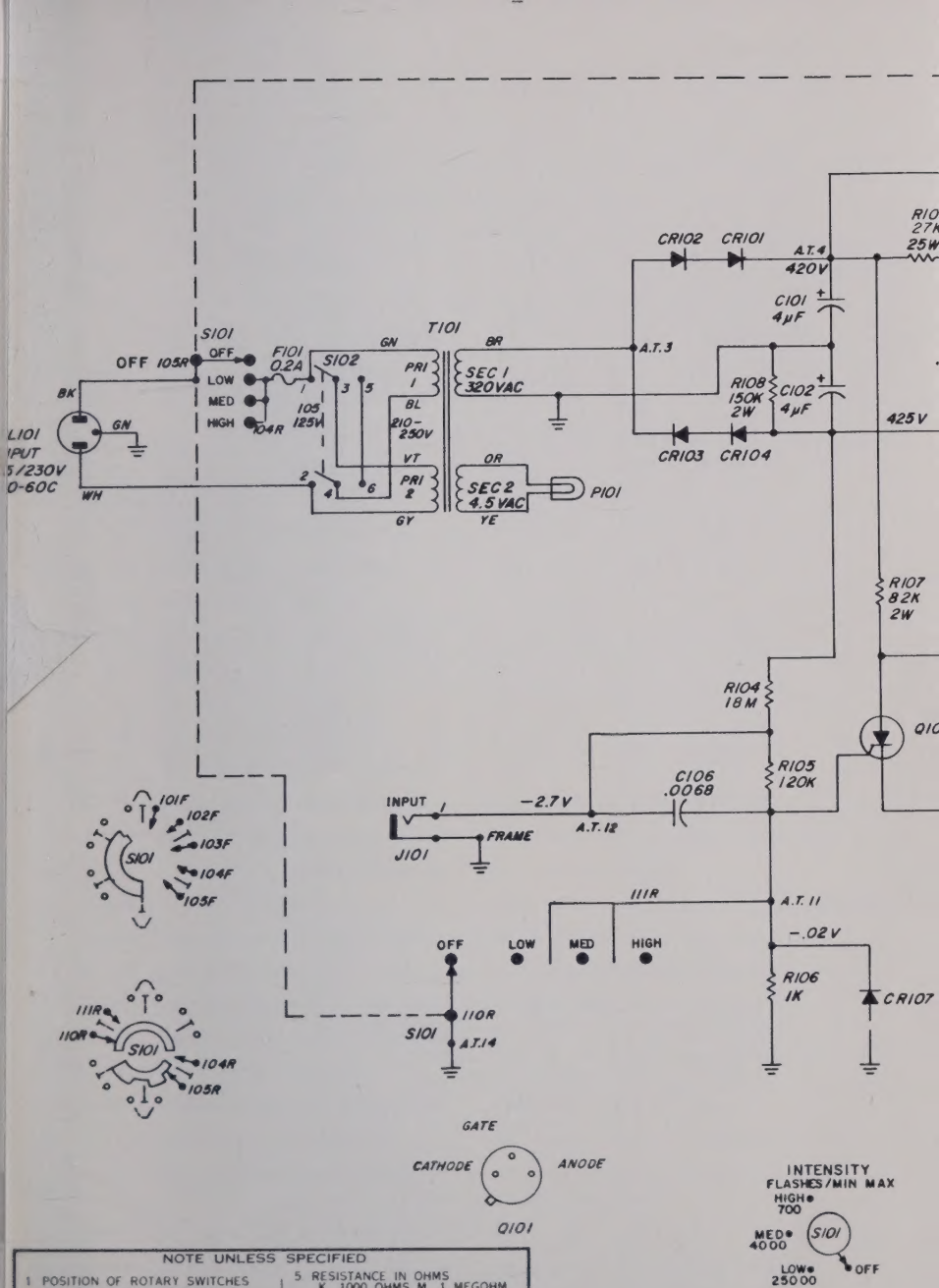


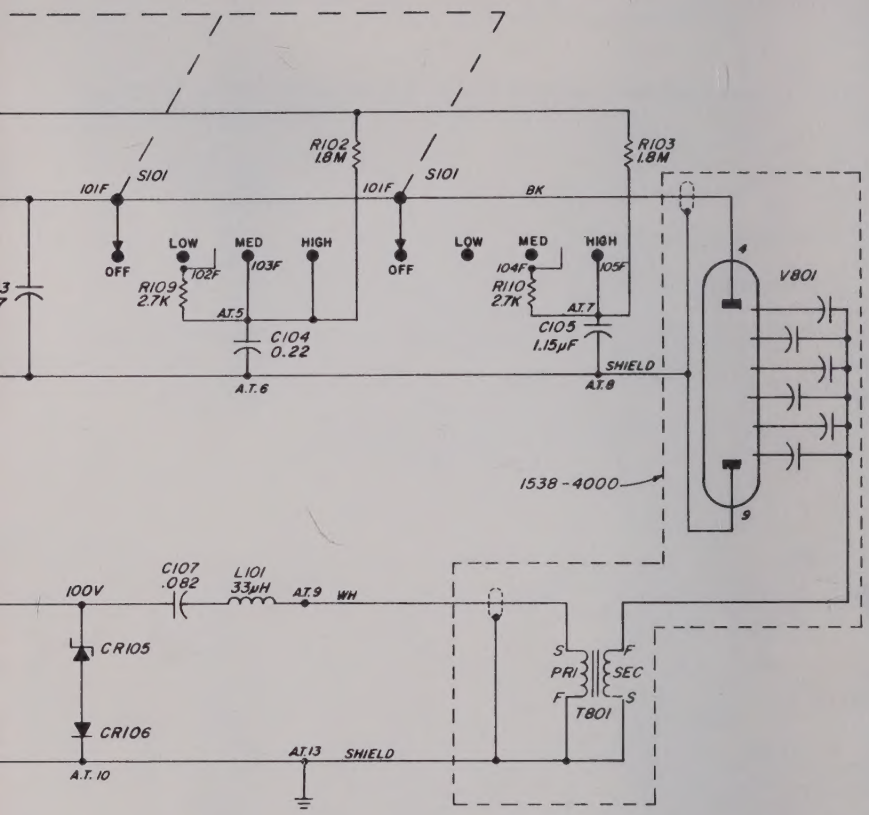
Figure 4-3. Etched-board layout for the Type 1539-A Stroboslave.

NOTE: The number appearing on the etched board is the part number of the board only. The part number of the complete etched-board assembly, with circuit components, is 1539-2701.



NOTE UNLESS SPECIFIED

1. POSITION OF ROTARY SWITCHES SHOWN COUNTERCLOCKWISE.
2. CONTACT NUMBERING OF SWITCHES EXPLAINED ON SEPARATE SHEET SUPPLIED IN INSTRUCTION BOOK.
3. REFER TO SERVICE NOTES IN INSTRUCTION BOOK FOR VOLTAGES APPEARING ON DIAGRAM.
4. RESISTORS 1/2 WATT.
5. RESISTANCE IN OHMS K 1000 OHMS M 1 MEGOHM
6. CAPACITANCE VALUES ONE AND OVER IN PICOFARADS, LESS THAN ONE IN MICROFARADS.
7. ◯ KNOB CONTROL
8. ◯ SCREWDRIVER CONTROL
9. AT ANCHOR TERMINAL
10. TP TEST POINT



1. VOLTAGES ARE GIVEN FOR 115/230 VOLT LINE.
2. DC VOLTAGES ARE MEASURED WITH RESPECT TO GROUND USING A VTVM AND MAY VARY ±10%.
3. VOLTAGES ARE GIVEN FOR NO INPUT SIGNAL.

Figure 4-4
Schematic diagram for the Type 1539-A Stroboslave.

ELECTRICAL PARTS LIST

PC BOARD P/N 1539-2701

REFDES	DESCRIPTION	PART NO.	FMC	MFG PART NUMBER
C 101	CAP ALUM 10UF 475V	4450-6175	90201	TCG 10UF 475V
C 102	CAP ALUM 10UF 475V	4450-6175	90201	TCG 10UF 475V
C 103	CAPACITOR,PAPER .047UF 10PCT	1531-4000	24655	1531-4000
C 104	CAPACITOR	1531-0470	24655	1531-0470
C 105	CAPACITOR	1531-4020	24655	1531-4020
C 106	CAP CER DISC 6800PF 20PCT 1.4KV	4406-2689	72982	848-Z5U-6800PF20PCT
C 107	CAP MYLAR .082UF 10 PCT 100V	4860-7875	56289	410P .082 UF 10PCT
CR 101	RECT 1N4005 600PIV .75A SI A50A	6081-1003	14433	1N4005
CR 102	RECT 1N4005 600PIV .75A SI A50A	6081-1003	14433	1N4005
CR 103	RECT 1N4005 600PIV .75A SI A50A	6081-1003	14433	1N4005
CR 104	RECT 1N4005 600PIV .75A SI A50A	6081-1003	14433	1N4005
CR 105	ZENER 1N985B 100V 5PCT .4W	6083-1043	03877	1N985B
CR 106	DIODE RECTIFIER 1N645	6082-1016	14433	1N645
CR 107	DIODE RECTIFIER 1N645	6082-1016	14433	1N645
L 101	CHOKE MOLDED 33 UH 10PCT	9300-2900	99800	2150-36
Q 101	TRANSISTOR 2N2324	8210-1079	03508	2N2324
R 102	RES COMP 1.8 M 5PCT 1/2W	6100-5185	81349	RCR20G185J
R 103	RES COMP 1.8 M 5PCT 1/2W	6100-5185	81349	RCR20G185J
R 104	RES COMP 18 M 5PCT 1/2W	6100-6185	81349	RCR20G186J
R 105	RES COMP 120 K 5PCT 1/2W	6100-4125	81349	RCR20G124J
R 106	RES COMP 1.0 K 5PCT 1/2W	6100-2105	81349	RCR20G102J
R 107	RES COMP 82 K 10PCT 2W	6120-3829	81349	RCR42G823K
R 108	RES COMP 150 K 10PCT 2W	6120-4159	81349	RCR42G154K
R 109	RES COMP 2.7 K 5PCT 1/2W	6100-2275	81349	RCR20G272J
R 110	RES COMP 2.7 K 5PCT 1/2W	6100-2275	81349	RCR20G272J
S 101	SWITCH ROTARY ASM	7890-3990	24655	7890-3990

CHASSIS MOUNTED PARTS P/N 1539-3000

REFDES	DESCRIPTION	PART NO.	FMC	MFGR PART NUMBER
F 101	FUSE SLO-BLOW 2/10A 250V	5330-0600	75915	313 .200
J 101	BODY CONNECTOR JACK	4260-1295	24655	4260-1295
P 101	LAMP FLANGE BASE 6V 0.2A 10000H	5600-0300	71744	CM-328
PL 101	CORD 3WR 10A 120V US 5.5FTHAMMER	4200-1904	24655	4200-1904
R 101	RESISTOR 27K 5PCT 25W	1531-0410	24655	1531-0410
S 102	SWITCH SLIDE 2POS DPDT STEADY	7910-0831	82389	11A-1274
T 101	TRANSFORMER POWER	0745-4120	24655	0745-4120

EXTENSION LAMP ASM P/N 1538-4000

REFDES	DESCRIPTION	PART NO.	FMC	MFGR PART NUMBER
T 801	COIL WOUND	1538-2400	24655	1538-2400
V 801	1538-P1 REPLACEMENT FLASH LAMP	1538-9601	24655	1538-9601

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14433	ITT., W. Palm Beach, FL 33402
24655	GenRad., Concord, MA 01742
56289	Sprague., North Adams, MA 01247
71744	Chicago Min. Lamp., Chicago, IL 60640
72982	Erie., Erie, PA 16512
75915	Littelfuse., Des Plains, IL 60016
81349	Military Specifications
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90201	Mallory Cap., Indianapolis, IN 46206

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